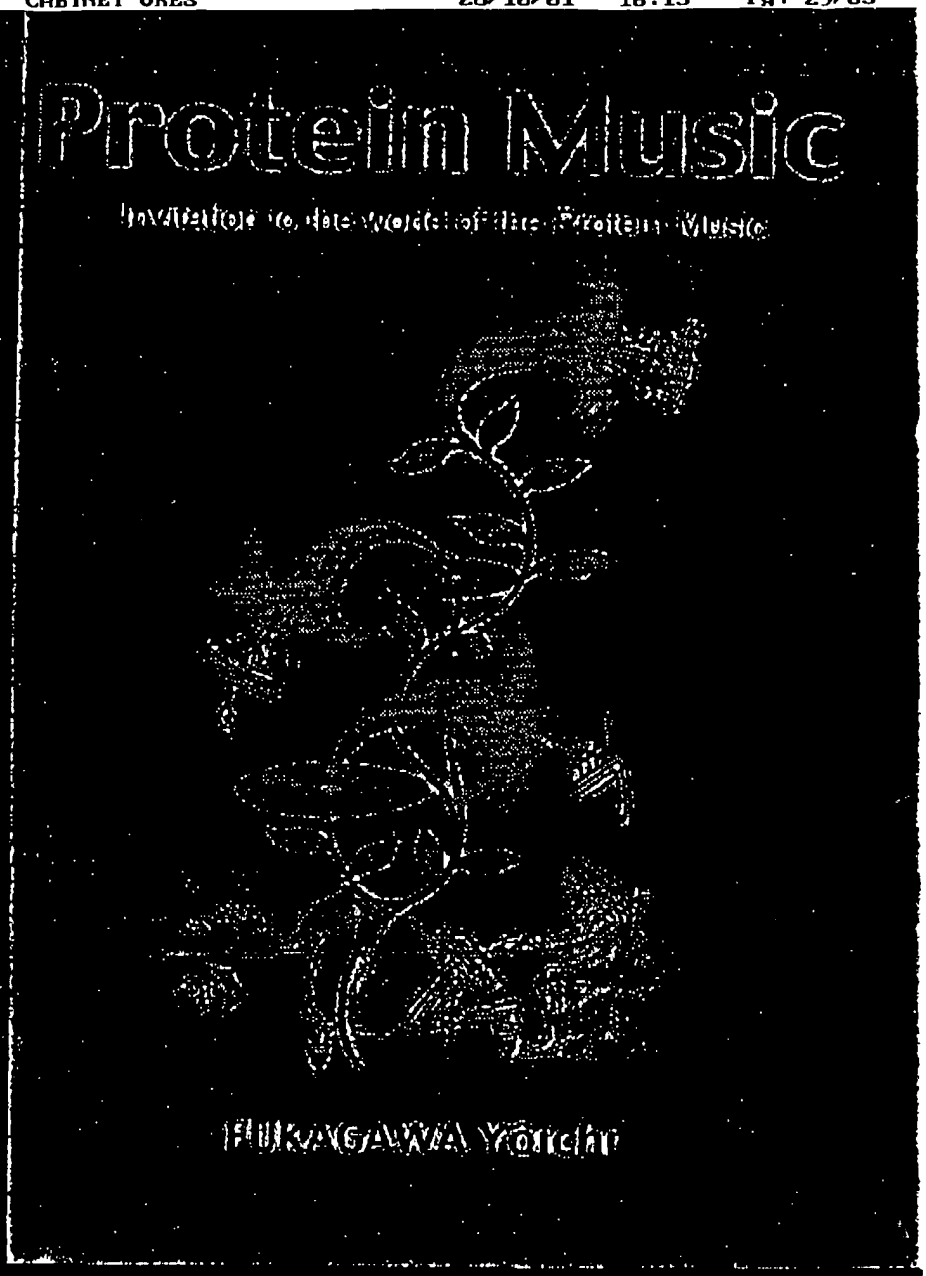
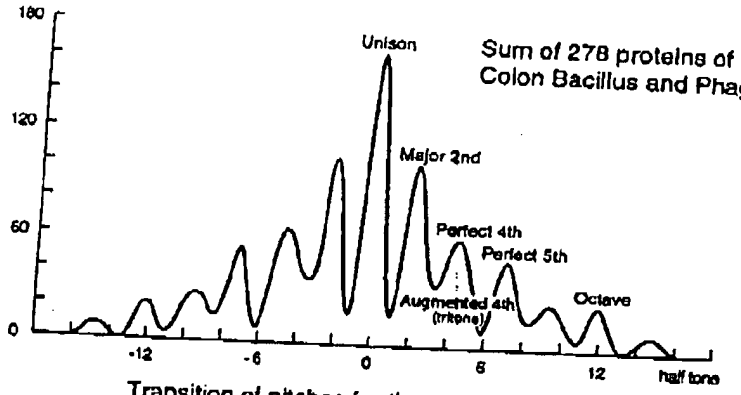
Annex 2

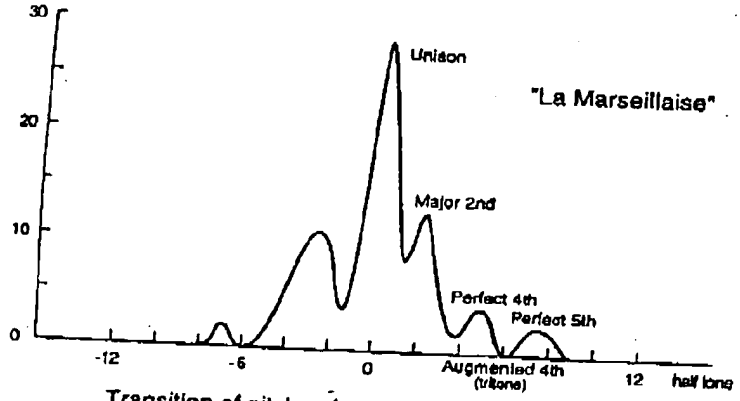


Annex 2

Protein Music



Transition of pitches for the <Protein music>



Transition of pitches for a man composed melody

(envelope curves are smoothed for both charts)

Annex 3

EPIGENETIC REGULATION OF PROTEIN BIOSYNTHESIS APPLIED TO BLUE-GREEN ALGAE IN CULTURE

Pedro Ferrandiz

The following experiment takes source in a seminar given in 1995 by Joel Sternheimer at the European University of Research.

Results of various experiments on the epigenetic regulation of protein biosynthesis having been exposed, a fruitful discussion arised within the audience. Dr J.P.Gerard pointed out that the results were surely interesting, yet the number of parameters involved in tomato cultures or bread making for example was quite large. It would be advantageous, he said, to study systems as simple as possible so that the number of parameters be reduced. Meanwhile Michel Lempereur, who was interested in pollution problems, offered to provide us with equipment to work in aquatic medium. We thus decided to investigate the application of the epigenetic regulation process to aquatic prokaryotic algae.

We undertook to stimulate the growth of blue-green algae -prokaryotes, genus Anabaena- by epigenetic regulation. Their photosynthetic activity involves in particular pigmentary proteins (cyanins). Thus their biosynthesis is easily observed through color change and oxygen release.
We want to point out that this first attempt of stimulation in an aquatic medium is relatively simple to reproduce. We believe that the results obtained are particularly promising. One may add the fact that it points towards numerous applications

Materials ans methods.

- Dilution of 12 ml of Anabaena variabilis (stock provided by the Ecole Normale Superieure de Paris) in 1500 ml of mineral water.
- Addition of 40 g of dry vegetable manure containing 8%, say 2.6 g, of nitrates as well as 40 g of river pebbles (As suggested by Vincent Bargoin this would provide the solution with trace elements).
- Adaptation time to the cultures medium: four days.
- Transfer of 750 ml of the solution in two vats subjected to natural enlightment. This setting in culture started on the 30th of April.

Musical diffusions.

The music has been diffused in one of the vats, by mean of an aquatic speaker Altec UW-30, while the other vat served as a control.
The proteins transcripted in musical sequences were the following:

- TAPE I (45 mn)

NIF H of Anabaena v. (five times)
Allophycocyanin of Anabaena v. (three times)
Plastocyanin of Anabeana v. (three times)
Nitrate reductase of Chorella s. (three times)
PS1 photosystem protein of Anabaena v. (Three times) (*)
Ferredoxin of Anabaena v. (five times)
protein 35 K of Anabaena v. (eight times) (*)

- TAPE II (15 mn)

Allophycocyanin of Anabaena v. (two times)
Plastocyanin of Anabaena v. (two times)
PS1 photosystem protein of Anabaena v. (three times) (*)
Ferredoxin of Anabaena v. (four times)
Protein 35 K of Anabaena v. (eight times)